

The Malay Version of the Perceived Stress Scale (PSS)-10 is a Reliable and Valid Measure for Stress among Nurses in Malaysia

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Abstract

Background: The Perceived Stress Scale-10 (PSS-10) is widely used to assess stress perception. The aim of this study was to translate the original PSS-10 into Malay and assess the reliability and validity of the Malay version among nurses.

Methods: The Malay version of the PSS-10 was distributed among 229 nurses from four government hospitals in Selangor State. Test-retest reliability and concurrent validity was conducted with 25 nurses with the Malay version of the Depression Anxiety Stress Scales (DASS) 21. Cronbach's alpha, confirmatory factor analysis (CFA), intraclass correlation coefficient and Pearson's r correlation coefficient were used to determine the psychometric properties of the Malay PSS-10.

Results: Two factor components were yielded through exploratory factor analysis with eigenvalues of 3.37 and 2.10, respectively. Both of the factors accounted for 54.6% of the variance. CFA yielded a two-factor structure with satisfactory goodness-of-fit indices [$\chi^2/df = 2.43$; comparative fit index (CFI) = 0.92, goodness-of-fit Index (GFI) = 0.94; standardised root mean square residual (SRMR) = 0.07 and root mean square error of approximation (RMSEA) = 0.08 (90% CI = 0.07–0.09)]. The Cronbach's alpha coefficient for the total items was 0.63 (0.82 for factor 1 and 0.72 for factor 2). The intraclass correlation coefficient (ICC) was 0.81 (95% CI: 0.62–0.91) for test-retest reliability testing after seven days. The total score and the negative component of the PSS-10 correlated significantly with the stress component of the DASS-21: ($r = 0.61, P < 0.001$) and ($r = 0.56, P < 0.004$), respectively.

Conclusion: The Malay version of the PSS-10 demonstrated a satisfactory level of validity and reliability to assess stress perception. Therefore, this questionnaire is valid in assessing stress perception among nurses in Malaysia.

Keywords: Malaysia, stress, nurses, reliability, validity

Introduction

Stress is an experience that is well studied in the medical sciences. A person is considered under stress when he/she is not able to accommodate the demands of a situation (1). Numerous scales/questionnaires are available to measure or determine if a person is experiencing stress. Some of the commonly used scales/questionnaires include the Depression Anxiety Stress Scales (DASS) questionnaire (2), the General Health Questionnaire (GHQ) (3), and the Perceived Stress Scale (PSS) (4). Cohen et al. (5) created the Perceived Stress Scale (PSS), which

assesses global perception of stress by measuring the feelings and thoughts in the past month. It assesses the life events of an individual that happened unexpectedly and those things he/she is unable to control in their life. The wide usage of this scale can be attributed to its simplicity and its free availability for research or academic purposes. This scale was initially introduced as a 14-item scale (PSS-14). Subsequently, a 10-item scale (PSS-10) and a 4-item scale (PSS-4) were introduced. The items for the PSS-10 and the PSS-4 were selected from the original 14 items of the

PSS-14.

In a study conducted in the United States among 2387 adults, the PSS-14 demonstrated a two-component analysis; the first factor accounted for 25.9% and the second factor accounted for 15.7% (total 41.6%) of variance. The Cronbach's alpha of the total scale was 0.78. In addition, the PSS-10 also showed a two-factor component but with a higher combined variance of 48.9% (34.3% for the first factor and 14.5% for the second factor). The Cronbach's alpha of the total scale was similar to that of the PSS-14 (6). The PSS is widely used for research purposes and is available in multiple languages, such as Greek (7), Thai (8), Chinese (9), Japanese (4), and Malay (10-12).

The Malay version of the PSS-10 has been found to have psychometric properties comparable to the original English version of the PSS-10 as it has been validated among female prisoners (10), diabetic patients (11), and medical students (12) in Malaysia. However, no validation of the Malay version of the PSS-10 has been conducted among the working population. Therefore, this study was conducted to assess the reliability and validity of the Malay version of the PSS-10 among the working population of nurses in Malaysia's government hospitals.

Materials and Methods

Participants

This study is part of an ongoing study that attempts to determine the association between work-related fatigue and metabolic syndrome among nurses. It involves nine government hospitals in Selangor State, and the participants were nurses 40 years and older who had undergone yearly screening at the respective hospitals from January 2012 until December 2013. However, for this study, the nurses from four government hospitals were studied as the remaining hospitals were still undergoing the data collection process. Verbal consent was obtained before the distribution of the questionnaire. Two hundred and twenty-nine out of 274 nurses took part in this study (45 questionnaires were incomplete). This study obtained ethical approval from the Medical Research and Ethics Committee (MREC) with approval no. 1087-12404.

Instrument

The PSS-10 has 10 items on a 5-point Likert scale (0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, 4 = very often). Four positively stated items (item 4, 5, 7, and 8) are reversely scored (0 = very often, 1 = fairly often,

2 = sometimes, 3 = almost never, 4 = never). The sum of the 10 items represents the total score, with higher scores representing higher levels of perceived stress. Approval of usage of the original PSS-10 was obtained from Sheldon Cohen prior to the translation process.

For this study, the Malay version of the DASS-21 questionnaire was used. This questionnaire has been validated among the Malaysian general population (14) and among diabetes patients (15). The original DASS consists of 42 items, and these items were divided into the following three subscales: anxiety, stress, and depression. Lovibond (16) introduced the modified and shorter version of the DASS-21 items, and the total scores of the DASS-21 had to be multiplied by 2 to correspond with the original DASS 42 items score. Each subscale of the DASS-21 has 7 items on a 4-point Likert scale between 0 (Did not apply to me at all) to 3 (Applied to me very much, or most of the time). Each of these subscales were further categorised into normal, mild, moderate, severe, and extremely severe ratings following multiplications of the scores range for each of these subscales (16). For the stress subscale, the score range of 0 to 7 is normal, 8 to 9 is mild, 10 to 12 is moderate, 13 to 16 is severe and 17 and above is extremely severe. For the anxiety subscale, the normal category ranges from 0 to 3, the mild category ranges from 4 to 5, the moderate category ranges from 6 to 7, the severe category ranges from 8 to 9 and the extremely severe category ranges from 10 and above. For the depression subscale, the range between 0 and 4 is normal, 5 to 6 is mild, 7 to 10 is moderate, 11 to 13 is severe and 14 and above is extremely severe. These questionnaires are not used for diagnostic purposes, but rather as a severity measurement (14).

Translation

The English version of the PSS-10 was translated into Malay by a language expert. Then, the Malay version was back-translated into English language by another language expert. The English back-translated version was compared to the original English PSS-10 version. Any grammatical errors or language errors in the Malay version were corrected. These processes were repeated until a final version of the Malay PSS was derived. Pilot testing of the final Malay version was conducted among 35 nurses from a university hospital, and final corrections to grammatical and language errors were made. During the translation process, none of the language experts had prior knowledge of the English version of the

PSS-10. The previously translated Malay PSS-10 questionnaires were not available to the authors during this study.

Data collection

The questionnaires were distributed to the respondents by an assigned person from each hospital, and they were given coding to maintain the respondents' privacy. The objectives of the study were conveyed to the respondents and verbal consent was obtained from the respondents prior to questionnaire distribution. Test-retest reliability was conducted by redistributing the questionnaires after 7 days to 30 nurses from the initial study. However, only 25 respondents returned the questionnaires.

Statistical analysis

The data analysis was conducted by using SPSS version 19. An exploratory factor analysis was conducted and the values of the Kaiser-Meyer-Olkin (KMO), Measure of Sampling Adequacy (MSA), and Bartlett's test of sphericity were observed. Principal component analysis and varimax rotation were used to assess the factor structure (4,12). Confirmatory factor analysis (CFA) was used to determine the goodness of fit of two construct of the Malay translated PSS-10. Fit indices were indicated by the comparative fit index (CFI) ≥ 0.90 , the goodness-of-fit Index (GFI) ≥ 0.90 , the standardised root mean square residual (SRMR) ≤ 0.10 and the root mean square error of approximation (RMSEA) ≤ 0.08 (13). Cronbach's alpha coefficient was measured to determine the internal consistency of the Malay version of the questionnaire. Intraclass correlation coefficient was used to determine the test-retest reliability. Pearson coefficient was conducted to determine the concurrent validity between the PSS-10 subscales and the DASS-21 subscales.

Results

Socio-demographic characteristics

There were 229 respondents in the study with a mean (SD) age of 48.3 (SD 5.6) years. There were 210 (91.7%) married respondents, and 100 (43.7%) of the respondents have mixed work (Table 1). The mean (SD) of working experience was 23.6 (SD 5.9) years. The mean (SD) score of stress was 15.9 (SD 4.3).

Reliability testing of the PSS-10

The value of Cronbach's alpha coefficient for the first factor (6 items) was 0.82 and 0.72 for the second factor (4 items). The overall alpha value

was 0.63. The intraclass correlation coefficient (ICC) testing was 0.81 (95% CI: 0.62–0.91) for retest reliability testing after 7 days.

Factor analysis

Prior to conducting exploratory factor analysis, a KMO measure of sampling adequacy test and Bartlett's test of sphericity were performed to demonstrate the adequacy of the samples to perform factor analysis. The KMO measure of sampling was 0.79 and Bartlett's test of sphericity was significant ($P < 0.001$), and therefore the sample size was adequate. Factor analysis with varimax rotation yielded two factor components.

Table 1: Respondents' socio-demographic characteristics (n = 229)

Variable	Number (n)	Frequency (%)
Age		
40–44	69	30.1
45–49	62	27.1
50–54	53	23.1
55–59	44	19.2
60–64	1	0.4
Ethnicity		
Malay	185	80.8
Indian	24	10.5
Chinese	19	8.3
Others	1	0.4
Marital status		
Married	210	91.7
Single	9	3.9
Divorced	5	2.2
Widow	5	2.2
Work routine		
Office work	88	38.4
Shift	41	17.9
Mixed	100	43.7
Working experience (years)		
10–14	9	3.9
15–19	59	25.8
20–24	58	25.3
25–29	59	25.8
30–34	36	15.7
35–39	8	3.5

The first factor included 6 items (items 1, 2, 3, 6, 9, and 10) which explained 32.1% of the variance. The second factor included 4 items (items 4, 5, 7, and 8) which explained 22.5% of the variance. Both of the factors explained 54.6% of the variance. The first factor consisted of all the negatively worded items while the second factor consisted of all the positively worded items. The eigenvalues of the factors were 3.37 and 2.10, respectively (Table 2). The standardised factor loading values of all the items ranged between 0.63 and 0.83, while the factor correlation was -0.12 (Table 3). Only a single loading pattern matrix was observed for all the items. The CFA showed acceptable goodness-of-fit indices for the two-factor model [$\chi^2 = 82.87$, $df = 34$ ($\chi^2/df = 2.43$)]; CFI = 0.92, GFI = 0.94; SRMR = 0.07 and RMSEA = 0.08 (CI = 0.07–0.09).

Concurrent validity

The Pearson's r correlation coefficients between the total score of the Malay PSS-10 and the stress component of the Malay DASS-21 correlation was significant ($r = 0.61$, $P < 0.001$). The negative component of the PSS-10 correlates significantly with the stress component of the DASS-21 ($r = 0.56$, $P < 0.004$), while

the other scales of the PSS-10 were not correlated significantly with the DASS-21 subscales (Table 4).

Table 3: Standardised factor loadings of the confirmatory factor analysis (CFA) for 2 factor model of Malay translated PSS-10

Item no	Factor loadings	
	Factor 1	Factor 2
1	0.63	
2	0.78	
3	0.65	
4		0.64
5		0.50
6	0.67	
7		0.57
8		0.83
9	0.60	
10	0.63	
Factor correlation		-0.12

Table 2: Total variance explained of principal factor analysis

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings	
	Total	Variance (%)	Cumulative (%)	Total	Variance (%)
1	3.365	33.649	33.649	3.208	32.079
2	2.095	20.948	54.597	2.252	54.597
3	0.814	8.141	62.738		
4	0.749	7.494	70.232		
5	0.706	7.058	77.290		

Table 4: Pearson r correlation coefficients between PSS-10 and Depression Anxiety Stress Scales (DASS 21) subscales

	DASS 21					
	Stress		Anxiety		Depression	
	r	P	r	P	r	P
PSS –10 scales						
Positive	0.224	0.286	-0.221	0.924	0.052	0.823
Negative	0.556	$< 0.004^*$	0.379	0.063	0.383	0.062
Total	0.611	$< 0.001^*$	0.323	0.124	0.356	0.084

r = Pearson r correlation coefficients.

* Significant P value ($P < 0.01$).

Discussion

This study demonstrated that the validity and reliability of the Malay version of the PSS-10 is supported by the results in a working population of nurses at government hospitals. From the results, it is evident that the Malay version of the PSS-10 consists of two factors and that both of the factors together constitute 54.6% of the variance. Factor 1 included item number 1, 2, 3, 6, 9, and 10, while the other items were loaded to factor 2. These findings collaborate with the original version of the PSS-10, whereby two factors were also deduced and the combined variance was reported as 48.9% (6). In addition, three previous studies that had translated the PSS-10 into Malay yielded two factor components with a reported total variance of 50% (10), 57.8% (12), and 59.2% (11). The original PSS-10 was also translated to other languages, and all of these studies derived similar conclusions for the two factor components of their respective languages with similar items number loading for the two factors (7–9). Confirmatory factor analysis yielded a two-factor model with acceptable fit indices. However, unlike previous studies, this study failed to generate good fit indices, which may be due to the relatively small sample size (7–8,17).

In this study, factor 1 consisted of items that resulted in a negative impression or perception while factor 2 consisted of items that resulted in a positive impression or perception. Similar results were reported by Cohen and Williamson (6) and Roberti et al. (17). In his study, Roberti et al. (17) named the first factor as 'Stress' or 'Perceived Helplessness' and the second factor as 'Control' or 'Perceived Self-Efficacy'. The standardised factor loading of items in this study ranged from 0.50 to 0.83. The relatively low loading for item 5 and 7 may be due to a translational error made by the authors or a misinterpretation error made by the respondents. The standardised factor loading range of this study was satisfactory as the loading range is within the range of other studies (7–9). The negative correlation between the two factors further supports the two-factor structure of the Malay version of the PSS-10 (7,9).

In regards to the reliability of the Malay version of the PSS-10, it is considered satisfactory since the Cronbach's alpha coefficient yielded was almost similar to other studies (6,11,12). The Cronbach's alpha coefficient of this study was 0.82 for the first factor and 0.72 for the second factor. The total scale Cronbach's alpha coefficient was 0.63. Since the PSS-10 questionnaire has two

factors, it is recommended to report the Cronbach's alpha of each factor separately; furthermore, the Cronbach's alpha values between 0.70 and 0.80 are considered satisfactory (19). As with other studies, this study demonstrated a good test-retest reliability of the questionnaire after a 7 days interval (5,8,12). Furthermore, this study showed a significant correlation with the stress component of the Malay version of the DASS-21. The higher the scores of the Malay version of the PSS were strongly related to the severity scales of the stress component of the DASS-21. Therefore, this shows that the translated PSS-10 questionnaire is valid to be used for stress detection among the study population.

Limitations of the study

The study population was limited to female nurses from four government hospitals, which limits its generalisability to an overall working population. The test-retest reliability was assessed with a limited sample size, thus limiting its reliability.

Conclusion

The Cronbach's alpha, both overall and for the first and second factors, was adequate and the intraclass correlation coefficient was satisfactory. Factor analysis yielded two factor components in which each factor satisfied the goodness-of-fit indices. The correlation between the PSS-10 and the DASS-21 supported the presence of concurrent validity. We concluded that the Malay version of the PSS-10 is a valid and reliable instrument to measure perceived stress among nurses in Malaysia.

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Conflict of Interest

None.

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Authors' Contributions

Conception and design, analysis and interpretation of the data: SSS, NHI, KGR

Critical revision of the article for the important intellectual content, final approval of the article, statistical expertise: NHI, KGR

Drafting of the article, provision of study materials or patient, obtaining of funding, administrative, technical or logistic support and collection and assembly of data: SSS

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